REMARKS

The foregoing amendment amends claim 9 and adds claims 20-24. Pending in the application are claims 1-24, of which claims 1, 9, 15 and 24 are independent. Claims 1-8 and 15-19 have been withdrawn pursuant to a Restriction Requirement. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance.

Applicants have amended claim 9 to clarify the location of the discharge hole in the fuel cell stack. Specifically, claim 9 now recites that the discharge hole is provided in an additional plate, which is disposed adjacent to an end of the fuel cell units and separators in a stacking direction, as described on page 14, lines 23-27 of the application. The additional plate may be a bypass plate, an end plate or any other suitable component that includes a discharge hole for providing a reaction gas to a deep portion of the outlet side communication hole. Applicants also amend the preamble of claim 9 for purposes of clarity.

New claims 20-24 have been added to more fully claim the instant invention. Claims 20-21 depend from independent claim 9 further recite that the additional plate may comprise a bypass plate, and that the bypass plate may include a bypass passage. Claims 22-23 depend from independent claim 9 and further recite that the additional plate may comprise an end plate, and that a bypass piping outside of the end plate may be used to connect the inlet side communication hole and the discharge hole.

New independent claim 24 describes a fuel cell stack including an outlet side communication hole that *penetrates through the separators*. The fuel cell stack further includes a discharge port and a discharge hole, which are provided at opposite ends of the outlet side communication hole. Support for claim 24 can be found throughout the original specification, figures and claims, including, for example on page 12, last paragraph, original claim 1 and Figures 1, 15, 16 19, 20. *No new matter is added.*

Amendment and cancellation of the claims are not to be construed as an acquiescence to any of the objections/rejections set forth in the instant Office Action, and were done solely

to expedite prosecution of the application. Applicants reserve the right to pursue the claims as originally filed, or similar claims, in this or one or more subsequent patent applications.

Interview with Examiner Chaney

Applicants would like to thank Examiner Chaney for the courtesy of the Examiner Interview on August 20, 2003. In that Interview, claim 9 was discussed to clarify the location of the recited discharge hole and the discharge port. Applicants' Attorney also sent Example Figures A and B, attached hereto as Appendix A, to the Examiner for purposes of the discussion. Figure A illustrates the Applicants' understanding of the Examiner's interpretation of the position of the discharge hole and the discharge port, while Figure B illustrates the position of the discharge hole and the discharge port in an embodiment of the invention.

During the Interview, Applicants' Attorney explained to the Examiner that the discharge port H is located at one end of an outlet side communication hole (38b), for discharging gases from the outlet side communication hole, and the discharge hole 204 is located at an opposite end of the outlet side communication hole (i.e., the "deep portion"), for providing a reaction gas to extrude water from the outlet side communication hole. The discharge port is an interface between the interior of the outlet side communication hole and the exterior of the fuel cell. In the illustrative embodiment, the discharge port forms an outlet port of an outlet side communication hole for discharging gas from the outlet side communication hole. Applicants' Attorney also clarified that the discharge hole is a conduit or channel in communication with an outlet side communication hole. As discussed with the Examiner, the discharge hole of the fuel cell stack of an illustrative embodiment of the present invention is provided outside the "reaction region" of the fuel cell stack. The "reaction region" comprises the stack of fuel cell units and separators, i.e., where the reaction between the fuel gas and the oxygen-containing gas takes place to generate electricity.

The discharge hole of an illustrative embodiment is thus able to provide a connection between the inlet side communication hole and the outlet side communication hole in an area outside of to reaction region. As set forth in the application, the location of the discharge hole allows passage of a reaction gas from the inlet side communication hole, through the

discharge hole, and into the deep portion of the outlet side communication hole to extrude water from the outlet side communication hole, thereby increasing the fuel cell efficiency. In an illustrative embodiment, the reaction gas passing through the discharge hole is a gas that has not been reacted by a fuel cell unit.

35 U.S.C. 112 Rejections

Regarding the rejection of claims 9-14 under 35 U.S.C. 112, second paragraph, Applicants submit that the claims are clear and definite. The "discharge hole" is a conduit or channel for providing a reaction gas from an inlet side communication hole to a deep portion of the outlet side communication hole. In this manner, the discharge hole discharges the gas *from* the inlet side communication hole, by passing the reaction gas from the inlet side communication hole to the outlet side communication hole. Because the term "discharge hole" is clear and definite, particularly in view of the specification on page 27, line 6 through page 33, line 16, Applicants respectfully request that the rejection of claims 9-14 under 35 U.S.C. 112 be reconsidered and withdrawn.

35 U.S.C. 102 Rejections

Applicants thank the Examiner for the close review of the claims and for withdrawing the rejection of claims 9, 10 and 14 as being anticipated by Guthrie. In the Office Action, the Examiner rejects claims 9-11 under 35 U.S.C. 102(a) as being anticipated by Wariishi et al. (JP 200149977). Applicants respectfully submit that pending claims 9-14 and 20-24 are patentable over the cited Wariishi reference.

The Wariishi reference is directed to a fuel cell stack comprising fuel cell units and first and second separators alternately stacked with each other. In Wariishi, the hydrogen containing gas flows through the fuel gas supply passage 38, to the first flow passage 62, to the anode electrode 20, to the fuel gas discharge passage 44, and finally to the fuel gas outlet 56. The air in the Wariishi device flows through the oxygen-containing gas supply passage 40, to the second flow passage 64, to the cathode electrode 22, to the oxygen-containing gas discharge passage 46, and finally to the oxygen-containing gas outlet 58.

According to the Examiner, the recess 92 in the wedge member 90 of the Wariishi reference is a "discharge hole provided at a deep portion of the outlet side communication holes, and opposite a discharge port". Applicants respectfully disagree and submit that the recess 92 merely changes the cross-sectional shape of a passage in the fuel cell stack to decelerate a flow rate through the associated passage and increase static pressure. The recess 92 is not a hole that communicates with an outlet side communication hole. Furthermore, the recess 92 is located in an intermediate portion of an inlet passage, not a deep portion opposite a discharge port of an outlet side communication hole.

Furthermore, the "discharge port" cited by the Examiner is not an interface, i.e., an outlet, for discharging gasses from an outlet side communication hole. Rather, the grooves pointed out by the Examiner on page 4 of the Office Action merely connect a flow passage 64, which provides oxygen to a cathode electrode, with the discharge passage 48, to supply reacted gas from the cathode electrode to the discharge passage 48. These grooves are located in an intermediate portion of the fuel cell stack, i.e., on a separator. Therefore, the grooves cited by the Examiner could not be used to discharge gasses from the discharge passage.

The Wariishi reference does not teach or suggest a fuel cell stack including a discharge hole located in an additional plate disposed adjacent to an end of a plurality of fuel cell units and separators in a stacking direction, as recited in independent claim 9. The Wariishi reference also does not teach or suggest a fuel cell stack having an outlet side communication hole that penetrates the separators of the stack, which includes a discharge port a discharge hole formed at opposite ends of the outlet side communication hole, as recited in independent claim 24.

As recited in claim 9, a discharge hole in a fuel cell stack of an embodiment of the present invention is provided in an additional plate. The additional plate is located adjacent to an end of a plurality of fuel cell units and separators in a stacking direction, as described in the specification on page 14, lines 23-26 and page 26, lines 17-27 and shown in Figures 15-16 and 18-21. As recited in claim 20 and 21, the plate may comprise a *bypass plate*, as described on page 26, line 17 through page 31, line 27. Alternatively, the plate may comprise an *end plate* in the fuel cell, as recited in claims 22 and 23, and described on page 32 line 1

through page 33, line 16. Claim 9 is also intended to cover a discharge hole provided in any other suitable component located adjacent to an end of a plurality of fuel cell units and separators, i.e., outside the "reaction region" and is not limited to an end plate or a bypass plate.

The Wariishi reference does not teach or suggest a fuel cell stack that includes a discharge hole in communication with an outlet side communication hole, where the discharge hole is located in a component that is adjacent to, i.e., outside, the "reaction region" of the fuel cell stack. The reaction region includes the fuel cell units and the separators, which comprise the portion of the fuel cell stack where the actual fuel cell reaction occurs. In the Wariishi reference, the passages 62 and 64 cited by the Examiner are formed in a separator 14 or 16, to provide a fuel gas or oxygen-containing gas to either the anode electrode or the cathode electrode to effect the fuel cell reaction. The passages 62 and 64 are therefore provided within the so-called "reaction region" of the fuel cell stack, rather than in a component adjacent to the fuel cell units and separators, as recited in claim 9. The discharge hole 204 of the fuel cell stack of an illustrative embodiment of the present invention is clearly not formed in one of the separators, but rather, in a component, such as a bypass plate or an end plate, that is adjacent to a region comprising the fuel cell units and separators.

Because the fuel cell in Wariishi only connects a supply passage (50 or 52) with a discharge passage (56 or 58) within the "reaction region", i.e., via the fuel cell units or separators, the discharge passage is only provided with gas that has undergone a reaction in one of the fuel cell units. All of the gas passing through the supply passages 38, 40 and 42 in Wariishi passes through one of the fuel cell units, rather than a discharge hole. In contrast, an advantage of having a discharge hole connecting to an outlet side communication hole outside a reaction region, as recited in claim 9, is that reaction gas can pass directly to the outlet side communication hole, via the discharge hole, without being reacted within the fuel cell units. The provision of reaction gas via the discharge hole pushes accumulated water from the deep portion of the outlet side communication hole, which significantly improves the performance and efficiency of the fuel cell stack.

The dependent claims recite additional patentable features that are neither taught nor suggested in the Wariishi reference. For example, claims 11-13 and 20-21 recite a bypass passage for connecting an inlet side communication hole to an outlet side communication hole via a discharge hole, a feature that is lacking in the Wariishi reference. Wariishi does not teach or suggest a bypass passage passing hydrogen-containing gas from the supply passage 38 to the discharge passage 44. The Wariishi reference also does not teach or suggest a bypass passage for passing oxygen-containing gas from the supply passage 40 to the discharge passage 46. Rather, the hydrogen-containing gas in Wariishi flows from the supply passage 38 through the first passage 62 along the anode 20, which causes the hydrogen-containing gas to react, and then flows into the discharge passage 44. The oxygen-containing gas in Wariishi flows from the supply passage 40 through the second passage 64 along the cathode 22, which causes the oxygen-containing gas to react, and then flows into the discharge passage 46. The first and second passages are *not* bypass flow passages, since they are formed in a separator for causing the fuel cell reaction, and clearly do not then "bypass" the fuel cell reaction. The Wariishi reference also does not teach or suggest a bypass plate in a fuel cell stack, as recited in claims 20-21.

The Wariishi reference also does not teach or suggest a discharge hole located in an end plate of a fuel cell stack opposite a discharge port, as recited in dependent claims 22-23. For example, as clearly shown in Figure 1, the fuel cell stack of Wariishi does not include a discharge hole in the end plate 34, opposite any of the outlets 56, 58 and 60 formed in the other end plate 32. In Figures 10 and13, a fluid outlet 112 is located in the end plate 34. However, there is clearly no discharge hole located in the opposite end plate 32. Wariishi also clearly also does not teach or suggest bypass piping outside of an end plate for connecting an inlet side communication hole and a discharge hole located in an end plate, as recited in claim 23.

New independent claim 24 recites a fuel cell stack including an inlet side communication hole, an outlet side communication hole that penetrates through the separators in the fuel cell stack, a discharge port provided at a first end of the outlet side communication hole, and a discharge hole. The discharge hole is provided at a second end of the outlet side communication hole opposite the discharge port, a feature neither taught nor suggested in the Wariishi reference. The location of the discharge hole in an opposite end

of an outlet side communication hole that penetrates the separators from a discharge port inherently implies that the discharge hole is located outside of, or beyond the separators. However, in the Wariishi fuel cell, the passages 62 and 64 are provided in the separators. The passages 62 and 64 connect to an *intermediate* portion of a respective discharge passage 44 or 46, rather than to an end. The Wariishi reference also does not teach or suggest that an outlet side communication hole that penetrates separators in a fuel cell stack.

As described above, the cited references do not teach or suggest a horizontally stacked fuel cell stack comprising an inlet communication hole penetrating the separators of the fuel cell units, an outlet side communication hole and a discharge hole that connects to the outlet side communication hole in a region outside the fuel cell units and separators. Therefore, Applicants submit that claims 9-14 and 20-24 are allowable over the cited references.

Conclusion

For the foregoing reasons, Applicants contend that pending claims 9-14 and 20-24 distinguish patentably over the prior art and that the claims are clear and definite. As such, the Applicants respectfully request that the Examiner's rejections so far as they are based upon 35 U.S.C. §112 and 35 U.S.C. §102 be reconsidered and withdrawn and that the application be passed to allowance.

If there are any remaining issues, an opportunity for an interview is requested prior to the issuance of another Office Action. If the above amendments are not deemed to place this case in condition for allowance, the Examiner is urged to call the Applicants' representative at the telephone number listed below.

Respectfully submitted,

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